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TORREY BOTANICAL CLUB

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Studies on the Rocky Mountain flora — XIV

PER AXEL RYDBERG

Machaeranthera Fremontii sp. nov.

Biennial with thick taproot; stems several, glandular-hispid and somewhat puberulent, 4–5 dm. high, branched; basal leaves oblanceolate, petioled, glandular-hispid and scabrous, sharply dentate; upper leaves sessile, linear or lanceolate; heads over 1 cm. high; bracts linear-lanceolate, cinereous, acuminate, well imbricated; herbaceous tip short, lanceolate, only slightly squarrose; rays purple, 8–10 mm. long; achenes densely strigose; pappus brownish or reddish.

It grows in black soil of river bottoms.

COLORADO: "Platte Waters," 1844, *Fremont 421* (type in herb. Columbia Univ.).

Machaeranthera Selbyi sp. nov.

Biennial; stem reddish, branched above, glabrous below, puberulent or minutely strigose above, only slightly glandular in the inflorescence; lower leaves linear-oblanceolate to oblanceolate, petioled, glabrous or rarely slightly puberulent, dentate and ciliate on the margin; upper leaves linear; inflorescence branched and open; heads about 1 cm. high; bracts in many series, well imbricated; glandular green tips small, lanceolate, strongly reflexed-squarrose; achenes minutely strigose.

This is perhaps nearest related to *M. spectabilis*, but that species has entire leaves and longer green tips to the bracts. It is also related to *M. glabrella* and *M. ramosa*, from which species it differs in the reflexed-squarrose bracts.

COLORADO: Ouray, 1901, *Underwood & Selby 93a* (type), *204*, *204s*, *201* and *202*.

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Machaeranthera viscosula sp. nov.

Biennial with a rosette of basal leaves; stems few, about 2 dm. high, viscid-puberulent; basal leaves oblanceolate, petioled, the upper similar or linear, but sessile; all saliently and coarsely toothed; inflorescence narrow and racemiform, very viscid; heads about 1 cm. high; bracts linear, with a long linear-subulate spreading or reflexed green and very glandular tip, usually longer than the chartaceous lower portion; rays reddish-purple, 8–10 mm. long and fully 1 mm. wide; achenes sparingly strigose; pappus tawny.

This is closely related to *M. viscosa*, but differs in the lower stature, the racemiform inflorescence and the narrow saliently toothed basal leaves.

COLORADO: Veta Pass, 1896, *Shear 3655;* South Park, southeast of Jefferson, 1896, *Cowen 3222.*

Xylorrhiza Brandegei sp. nov.

Perennial with a cespitose caudex, canescent throughout, almost 1 dm. high; leaves spatulate or the upper oblanceolate, 3–4 cm. long, firm, closely and sharply serrate with bristle-tipped teeth; disk about 3 cm. wide; bracts narrowly linear-lanceolate, attenuate; achenes oblong, densely grayish-strigose, pappus tawny; rays rose-purple, 15–20 mm. long.

Closely related to **X. coloradensis** (*Aster coloradensis* Gray), but differs in the larger size, longer rays and scarcely spinescent bracts. It grows at an altitude of 3000 m.

COLORADO: San Juan Pass, 1875, *Brandegee* (type in the Gray herbarium).

Erigeron nematophyllus sp. nov.

Depressed cespitose-pulvinate perennial; flowering stems several, strigose, about 5 cm. high, few-leaved; both basal and cauline leaves linear-filiform, 2–4 cm. long, less than 1 mm. wide, strigose; heads solitary, 4–5 mm. high; bracts linear in 1–2 series, scarcely at all imbricated, acute, hirsute-strigose; rays pinkish or white, 4–5 mm. long and 1 mm. wide; achenes sparingly hirsute.

This is closely related to *E. radicatus*, but differs in the very narrow and erect leaves. It grows on rocky hills.

COLORADO: Dale Creek, 1897, *Osterhout* (type).

WYOMING: Fort Steele, 1901, *Tweedy 4103;* Sand Creek, 1900, *Aven Nelson 6993.*

Erigeron salicinus sp. nov.

Perennial with a slender rootstock; stem simple, 4–7 dm. high, glabrous or minutely and sparingly strigulose above; lower leaves petioled, about 1 dm. long; blades oblanceolate, dark bluish-green, glabrous except the minutely ciliolate entire margins, more or less distinctly 3-nerved; upper leaves linear or linear-lanceolate, sessile and half-clasping; inflorescence corymbiform, leafy; heads 7–8 mm. high; bracts linear-subulate, acuminate, glandular-puberulent, not at all hirsute, in 2 series but almost equal and crowded; disk 12–15 mm. wide; rays very numerous, fully 1 cm. long and less than 1 mm. wide, purple.

This is perhaps nearest related to *E. macranthus*, differing in the bluish-green narrow leaves, which are minutely ciliolate on the margin instead of hirsute-ciliate, and in the smaller heads.

COLORADO: Pagosa Springs, 1899, *Baker 670*.

Erigeron Vreelandii sp. nov.

Perennial with a rootstock; stem 6–7 dm. high, simple, sparingly pubescent and puberulent; lower leaves petioled, their blades oblanceolate; the rest sessile, lanceolate, somewhat clasping, entire, glandular-puberulent on both sides; inflorescence leafy, corymbiform; heads fully 1 cm. high; bracts linear-subulate, hirsute and glandular-puberulent, in 2 series, almost equal; disk 15–18 mm. wide; rays fully 1 cm. long, less than 1 mm. wide, very numerous, dark-purple.

This is nearest related to *E. subtrinervis*, but the leaves are glandular-puberulent instead of hirsute. It grows in meadows at an altitude of about 2300 m.

COLORADO: Wahatoya Creek, 1900, *Rydberg & Vreeland 5414*.

Erigeron Smithii sp. nov.

Perennial with a rootstock; stem simple, glabrous below, glandular-puberulent above; basal leaves 6–10 cm. long, petioled; blades oblanceolate or spatulate, glabrous, ciliate on the entire margins; upper stem-leaves lanceolate, sessile, more or less clasping and often reduced; heads 1–5, on long almost erect branches, about 6 mm. high; bracts linear-subulate, acuminate, glandular-puberulent, in two equal series; rays purple, 10–12 mm. long, 1 mm. wide; achenes strigose; pappus double, the outer of very short bristles.

This is closely related to *E. glabellus*, but is more glabrous, and has glandular-puberulent, not hirsute, bracts. It grows in rich meadows at an altitude of 2100–3000 m.

COLORADO: Parlin, Gunnison Co., '1901, *B. H. Smith 118* (type); Gunnison, 1901, *Baker 558;* Antonito, 1898, *Earle 42;* Sargent, 1896, *Clements 127;* Villa Grove, 1896, *Clements 123;* Leadville, 1901, *Underwood & Selby 494.*

Erigeron Earlei sp. nov.

Perennial; stems several, simple, 3–4 dm. high, strigose; basal leaves 5–6 cm. long, narrowly oblanceolate, strigose on both sides, often callous-denticulate; stem-leaves linear and sessile, and reduced; heads about 3, 6 mm. high; bracts linear-subulate, acuminate, in about 2 series, nearly equal, densely strigose; rays numerous and very narrow, white, about 8 mm. long.

This is related to *E. glabellus*, but differs from all its relatives by the appressed, dense, strigose pubescence.

COLORADO: Antonito, 1898, *Earle.*

Erigeron Peasei sp. nov.

Depressed cestipose perennial; stem 5–8 cm. high, scapiform or with 1–2 leaves, appressed-pubescent; basal leaves about 2 cm. long, petioled, their blades oblanceolate, acute, strigose; stem-leaves linear, sessile; heads solitary, 6–7 mm. high; bracts linear-subulate, scarcely at all imbricated, acuminate, sparingly hirsute; disk about 1 cm. wide; rays numerous, about 7 mm. long and 1 mm. wide.

This is nearly related to *E. radicatus*, but differs in the appressed pubescence and broader leaves.

COLORADO: Lake City, 1878, *H. N. Pease* (type in herb. Columbia Univ.).

Erigeron vetensis sp. nov.

Densely cespitose-puvinate perennial; stems 5–8 cm. high, hirsute, few-leaved; leaves linear or linear-oblanceolate, hirsute, 2–4 cm. long; heads solitary, about 7 mm. high; bracts linear, acuminate, hirsute as well as slightly glandular-puberulent; rays purple, 8–10 mm. long, over 1 mm. wide; achenes strigose; pappus more or less double.

In dry places on high mountains of southern Colorado at an altitude of 2400–3000 m. It is intermediate between *E. radicatus* and *E. glandulosus*, resembling the former most in pubescence, and the latter in habit.

COLORADO: Mountains near Veta Pass, 1900, *Rydberg & Vreeland 5427* (type); Veta Mountain and Ojo, *5421, 5422;* West Spanish Peak, *5424.*

Antennaria Sierrae-Blancae sp. nov.

Depressed perennial, pulvinate-cespitose, rosulate, almost stemless; leaves broadly spatulate, less than 1 cm. long, abruptly acute, white-floccose beneath, glabrate above; heads subsessile in the rosettes, 6–7 mm. in diameter; bracts broadly oblong to almost obovate, with a scarious brown upper portion.

Closely resembling *A. rosulata* in habit, it differs however in the smaller heads, brown bracts and leaves that are glabrate above. It grows at an altitude of 3600–4000 m.

COLORADO: Sierra Blanca, 1877, *Hooker & Gray* (type in Gray herbarium).

Helianthus aridus sp. nov.

Annual; stem 3–8 dm. high, more or less hispid; leaves all petioled, the lower opposite, the upper usually alternate; blades lanceolate, 4–7 cm. long, entire or crenate, acute, hispid-scabrous on both sides; heads rather few; bracts ovate, abruptly acuminate, hispid on the back and hispid-ciliate on the margins; disk 1.5–2 cm. wide, purplish; rays oblong to oval, 15–20 mm. long, 6–8 mm. wide; achenes cuneate, almost black, finely strigose, about 5 mm. long and 2 mm. wide.

This species has been mistaken for *H. petiolaris*, which it resembles most, but the bracts are hispid-ciliate and strongly acuminate in the manner of *H. lenticularis*. *H. aridus* grows in dry ground, especially in old fields and waste places.

MONTANA: Great Falls, 1885, *F. W. Anderson* (type); Polson, 1901, *Umbach 261*.

WYOMING: Gros Ventre Mountains, 1900, *C. C. Curtis*.

COLORADO: Manitou, 1901, *Clements 8* (mixed with *H. petiolaris*).

NEBRASKA: Kimball, 1891, *Rydberg 184*.

Tetraneuris Crandallii sp. nov.

Cespitose, acaulescent perennial; leaves narrowly linear-oblanceolate, conspicuously white-woolly at the base, 4–6 cm. long, 2–3 mm. wide, sparingly long-hairy, soon glabrate; scape 1–3 dm. long, sparingly strigose; involucre hemispherical; bracts about 8 mm. long, linear-oblong, silky-villous, but hairs rather appressed; rays about 15 mm. long, 5–8 mm. wide, 3-lobed, 4–5-nerved.

This species is related to *T. arizonica* and *T. pilosa*, but differs from the first in the narrow glabrate leaves, and from the latter in the narrow bracts and larger rays.

COLORADO: Grand Junction, 1894, *Crandall* (type); McCoy's, Eagle County, *Osterhout 2757*.

Tetraneuris angustifolia sp. nov.

Cespitose, acaulescent perennial; leaves narrowly linear-oblanceolate, 4–10 cm. long, 4–5 mm. wide, loosely and sparingly long-villous or glabrate in age, not densely villous at the base; scape 2–3 dm. high, strigose; involucre hemispherical; bracts oblong, obtuse, densely villous; disk 10–12 mm. wide; rays about 1 cm. long and 4 mm. wide, 3-toothed and conspicuously 4-nerved.

This species is nearest related to *T. scaposa*, from which it differs in the narrow leaves. It has therefore been mistaken for *T. lincaris;* but in that species the branches of the caudex are rather slender and elongated and the leaves are narrowly linear, 1–2 mm. wide. *T. angustifolia* grows on rocky hills up to an altitude of 2000 m.

NEW MEXICO: White Mountains, 1897, *Wooton 374* (type).

COLORADO: Fort Lyon, 1863, *Palmer*.

TEXAS: Kerrville, 1894, *Heller 1614;* Great Cañon of Mt. Carmel, 1852, *Parry* (Mex. Bound.) *638;* Belknap, 1858, *Hayes;* Rock Creek and Limpia, 1852, *Bigelow* (Mex. Bound); Rio Bravo del Norte, between San Pedro and Puercos, 1852, *Schott*.

Artemisia dracunculoides Wolfii var. nov.

Stout, usually with broader leaf-segments or leaves; heads larger, 3–5.5 mm. in diameter; outer bracts longer, lanceolate or linear-oblong, mostly acutish, nearly equaling the inner (in *A. dracunculoides* oblong, obtuse, about half as long as the inner).

COLORADO: Twin Lakes, 1873, *Wolf 530* (type); Hamor's Lake, north of Durango, 1898, *Baker, Earle & Tracy 628;* Grizzly Creek, 1896, *Baker*.

NEW MEXICO: Chama, 1899, *Baker 631*.

Artemisia saxicola nom. nov.

Artemisia Chamissoniana saxatilis Besser; Hook. Fl. Bor. Am. **1**: 324. 1833. Not *A. saxatilis* Waldst.

A. norvegica A. Gray. Syn. Fl. **1**^{2}: 371. 1884. Not *A. norvegica* Fries.

The American plant differs from the North European in having more numerous smaller heads on shorter peduncles, more hairy

leaves, lanceolate in outline, and taller stem. In the true *A. norvegica* the basal leaf-blades are as broad as long and have usually only 5 principal divisions.

Artemisia Brittonii sp. nov.

Perennial with a horizontal rootstock; stem rather stout, 3–6 dm. high, white-floccose; lower leaves cuneate or oblong-oblanceolate, 3–5-lobed mostly above the middle, densely white-tomentose on both sides, the lobes lanceolate; upper leaves ovate-lanceolate, entire; inflorescence paniculate; panicles narrow and heads conglomerate, 3–4 mm. high, about 2 mm. broad; bracts ovate and densely floccose; flowers about 15, heterogamous, light-brown or yellow; achenes and receptacle glabrous.

This is related to *A. ludoviciana* Nutt., but differing in the stouter habit, more crowded inflorescence, and principally in the leaves, which are equally tomentose on both sides.

COLORADO: Golden, 1882, *N. L. Britton* (type, in herb. Columbia College); Boulder, 1891, *Penard 285;* also 1902, *Tweedy 4906.*

UTAH: Green River, 1850, *Stansbury;* Salt Lake Valley, *Lauderdale;* Salt Lake City, 1884, *Harry Edwards.*

Artemisia Underwoodii sp. nov.

Perennial, with a horizontal much-branched rootstock; stems slender, 2–6 dm. high. somewhat floccose, usually simple up to the inflorescence; leaves 3–5 cm. long, pinnately parted, with 3–7 (usually 5) linear or linear-lanceolate acute lobes, densely white-floccose beneath, green and slightly tomentose above at first, but in age glabrate; inflorescence paniculate, but panicle narrow and the small heads crowded; heads campanulate, scarcely over 3 mm. high and 2.5 mm. broad; bracts ovate, tomentose, slightly scarious on the margin; flowers 15–20, heterogamous, brown; achenes and receptacle glabrous.

This is nearest related to *A. ludoviciana*, but differs in the deeply parted leaves and their narrow lobes. It grows on chaparral-covered hills and mountain-sides at an altitude of 2300–2700 m.

COLORADO: Ouray, 1901, *Underwood & Selby 74* (type) and *34;* Georgetown, 1895, *Ryberg.*

Artemisia pudica sp. nov.

Perennial with a horizontal rootstock; stem 4–6 dm. high, simple up to the inflorescence, white-floccose; leaves linear or narrowly linear-lanceolate, 6–10 cm. long, 6–8 mm. wide, entire, white-floccose on both sides; inflorescence a narrow panicle, the branches long and nearly erect, racemiform; heads nodding on short peduncles, campanulate, about 5 mm. high and 4 mm. broad; bracts ovate, densely tomentose, with a darker midrib and slightly scarious margin; flowers about 20, heterogamous, yellow; receptacle and achenes glabrous.

This species is related to *A. gnaplalodes*, but is characterized by the racemiform branches of the inflorescence with peduncled, nodding heads. It grows at an altitude of about 2300 m.

COLORADO: Gunnison, 1901, *Baker 573*.

Pyrrocoma lagopus sp. nov.

Perennial with a taproot; stems decumbent, 1–2 dm. long, more or less villous, especially at the base and the nodes; basal leaves petioled, 6–10 cm. long; blades lanceolate or linear-lanceolate, firm, distantly serrate with almost spinulose teeth; stem-leaves narrowly linear-lanceolate, sessile, with partly clasping bases; inflorescence racemiform; involucre 8–9 mm. high, more or less villous, especially at the base; bracts imbricated in about 3 series, oblong, acute, green on the back, yellowish on the sides and base; disk about 12 cm. wide; rays about 8 mm. long and over 1 mm. wide; achenes hirsute-strigose.

This species is nearest related to *P. Vaseyi*, but differs in the villous stem and involucre. In habit it also reminds one of *P. uniflora* and *P. inuloides*, but in these species the bracts are nearly in a single equal series. *P. lagopus* grows on dry plains and in saline flats.

WYOMING: Hams Fork and La Barge, 1900, *C. C. Curtis* (type).

COLORADO: North Park, 1899 (collector not given, but plants distributed from Herb. State Agr. Coll., under no. *3232*).

Tetradymia linearis sp. nov.

A low, unarmed shrub; bark of the older stems shining and flaky, that of the young branches more or less white tomentulose; leaves linear, white-tomentose, somewhat keeled, more or less arcuate-squarrose and pungent-pointed; bracts of the invo-

lucre usually 4, oblong, acute, white-tomentose, about 8 mm. long; flowers about 4; lobes of the corolla linear, about 3 mm. long; pappus very copious, yellowish; bristles scabrous; achenes hirsute-villous.

This species grows on dry hills and tablelands up to an altitude of 2300 m. It is nearest related to *T. inermis* Nutt., but is distinguished by the narrow, more or less squarrose, and pungent leaves.

UTAH: Rock Creek, 1877, *Palmer 264* (type, in herb. Columbia University).

COLORADO: Gunnison, 1901, *Baker 833*.

Arnica coloradensis sp. nov.

Perennial, about 2 dm. high and with about 3 pairs of leaves; stem villous; basal leaves obovate, nearly sessile, sparingly pubescent, 4–5 cm. long; stem-leaves sessile, ovate or ovate-lanceolate, 5-nerved; heads often solitary or few; involucre hemispherical; bracts broadly oblanceolate, acute or acuminate, often tinged with purple, sparingly villous and somewhat glandular, 8–9 mm. long; rays bright-yellow, over 1 cm. long and 5 mm. wide; achenes finely strigose.

This species is perhaps nearest related to *A. subplumosa*, but differs in the low habit, the single or few heads, and the broad involucral bracts.

COLORADO: 1872, *Parry* (in herb. Columbia University).

Carduus Osterhoutii sp. nov.

Stout; stem round-angled and striate, more or less tinged with purple, more or less arachnoid-hairy; leaves pinnately parted about halfway to the midrib, glabrate above, white-tomentose beneath; lobes at least of the larger leaves oblong, obtuse with a weak spine; heads 2.5–3 cm. high and about 2 cm. broad; bracts arachnoid-hairy, linear-lanceolate, without glandular dorsal ridge, gradually tapering into an almost erect, stout, flat spine; pappus scabrous.

This is nearest related to *C. Hookerianus* and *C. oreophilus*, but differs from both in the oblong, obtuse lobes of the larger leaves and the long, stout, flat spines of the involucre.

COLORADO: Red Cliff, Eagle Co., 1902, *Osterhout 2706* (type); Tennessee Pass, *2640*.

Carduus perplexans sp. nov.

Rather slender, about 5 dm. high; stem striate, purplish, slightly tomentose; lower leaves oblanceolate, the upper lanceolate and clasping, all merely toothed, with weak yellowish spines, glabrous and somewhat glaucous above, rather thinly white-tomentose beneath; heads about 3 cm. high and broad; bracts well imbricated, usually with a glandular back, the outer shorter and tipped with a short weak spine, the inner tipped with a dilated, deltoid, erose appendage; corolla rose or red-purple.

The appendages of the bracts would place this species nearest *C. Centaureae*, but the bracts are broader and have a distinct glandular back, the corolla is pink or purplish, and the whole plant suggests *C. altissimus* and its relatives. In fact the species combines characters of the *Carlinoides* and the *Altissimus* groups. It grows at an altitude of nearly 2100 m.

COLORADO: Cimarron, 1901, *Baker 286*.

Carduus coloradensis sp. nov.

Cnicus Drummondii A. Gray Syn. Fl. 1^2: 402, in part, *i. e.*, as to the Colorado specimens.

Rather stout, simple, 3–5 dm. high; stem striate, sparingly arachnoid; leaves 1.5–2 dm. long, 4–7 cm. wide, linear or oblong in outline, pinnately lobed about half-way to the midrib, sparingly arachnoid above, more or less white-tomentose beneath; lobes ovate, tipped with yellowish spines 2–5 mm. long and bordered with smaller spines; heads 3–4 cm. high and about as broad; bracts glabrous or nearly so, firm, more or less yellowish, without dorsal glandular ridge, well imbricated in many unequal series; the outer with weak spines; the inner unarmed and with slightly dilated crisp tips; corolla white or slightly pinkish.

This species has gone under the name of *C. Drummondii*, but the latter has larger heads often 5 cm. high and broad, broader and thin flat brownish or greenish bracts, broader erose appendages, red-purple corolla, and the leaves more deeply dissected, more arachnoid and scarcely at all tomentose. In reality *C. coloradensis* is more closely related to *C. scariosus*, from which it differs mainly in the less deeply dissected leaves and broader segments.

COLORADO: Pagosa Springs, 1899, *Baker 644* (type); Gunnison, 1901, *Baker 592*; Wolcott, 1902, *Osterhout 2651*.

Carduus floccosus sp. nov.

Stout, about 1 m. high; stem angled, loosely floccose; leaves oblanceolate in outline, about 2 dm. long, loosely floccose on both sides, divided two-thirds to the midrib; lobes 2-cleft, each division lanceolate, 1.5-2 cm. long, tipped with a spine about 5 mm. long; heads about 3 cm. high, 1.5–2.5 cm. wide; bracts slightly floccose on the margin and with a very narrow glandular dorsal line; the outer lanceolate, the inner linear-lanceolate, all with a short and weak spine; corolla red-purple.

This species belongs to the *C. undulatus* group and has been mistaken for that species. It has almost the same kind of leaves, although more loosely floccose; but the heads are very different, resembling more those of *C. Flodmanii* and *C. altissimus*, the bracts having a very slender glandular dorsal line.

COLORADO: Wolcott, 1902, *Osterhout 2652*.

Carduus Tracyi sp. nov.

Simple below; stem 3–7 dm. high, striate and loosely floccose; leaves oblanceolate in outline, divided to near the base, green but slightly floccose above, more or less tomentose beneath; lobes oblong to linear-lanceolate, tipped with yellow spines 5–8 mm. long; heads 3–3.5 cm. high and about 3 cm. or less wide; bracts slightly floccose when young, yellowish with a very broad and dark glandular spot on the back, the outermost and inner narrowly lanceolate, the middle ovate-lanceolate, all with a short spreading spine; corolla ochroleucous.

This is nearest related to *C. Nelsonii* Pammel, but is less tomentose, has smaller heads, more acute leaf-segments, and broader bracts with shorter, more slender and spreading spines. It grows in dry fields at an altitude of about 2100 m.

COLORADO: Mancos, 1898, *Baker, Earle & Tracy 90* (type); Green Mountain Falls, 1895, *E. A. Bessey*.

Gaertneria linearis sp. nov.

Perennial, shrubby at base; stems about 2 dm. high, sparingly hirsute, branched; leaves once or twice pinnate, 3–4 cm. long, strigose above, minutely tomentulose beneath; lobes linear, obtuse, 3–5 mm. long; staminate racemes about 3 cm. long; heads nodding, 3–4 mm. wide; involucre strigose, cleft scarcely halfways into rounded-ovate lobes; pistillate involucre with few slender spines.

This is perhaps nearest related to *G. tenuifolia*, but is shrubby at base; the leaves are smaller, finely tomentulose beneath and with linear obtuse (instead of oblong acute) divisions, of which the terminal is not conspicuously elongated. *G. linearis* grows at an altitude of 2100 m.

COLORADO: Calhan, 1893, *Saunders*.

Crepis tomentulosa sp. nov.

Scapose perennial, with a taproot; leaves basal, glabrous and glaucous, 1–1.5 dm. long, oblanceolate in outline, acute, sessile, dentate with sharp salient or reflexed teeth; scape 4–5 dm. high; stem-leaves, if any, linear-lanceolate, bract-like, entire; involucre turbinate, about 12 mm. high, as well as the upper part of the branches of the inflorescence tomentulose when young; bracts linear-lanceolate, acuminate, with dark backs, and with a few calyculate ones at their base; ligules bright-yellow, nearly 1 cm. long.

This species is nearest related to *C. glauca*, from which it differs principally in the tomentulose involucre and peduncles. It grows at an altitude of nearly 3000 m.

COLORADO: Ruxton Dell, near Pikes Peak, 1901, *Clements 342*.

Crepis petiolata sp. nov.

Perennial; stem with 1–3 leaves, glabrous and often purplish below, more or less glandular-hirsute above, especially the branches of the inflorescence; basal leaves long-petioled; blades oblanceolate or spatulate, usually obtuse, sinuate-dentate or entire, about 1 dm. long, glabrous and glaucous; stem-leaves oblanceolate and usually sessile; involucre about 12 mm. high, turbinate-campanulate, pubescent with glandular black hairs; bracts linear-lanceolate, acuminate; ligules about 12 mm. long and 3 mm. wide; achenes strongly ribbed; pappus white.

This species is related to *C. runcinata*, but the leaves are glabrous and long-petioled, and the stem-leaves are usually ample. It grows in the mountains at an altitude of 2000–2700 m.

COLORADO: Along Bear River, five miles east of Hayden, 1899, *Osterhout 21* (type); Georgetown, 1895, *Rydberg*.

WYOMING: Headwaters of Clear Creek and Crazy Woman River, 1900, *Tweedy 3088*.

Crepis perplexans sp. nov.

A scapose perennial; leaves about 1 dm. long, glaucous and glabrous or rarely with a few hairs on the midrib below and on

the margin of the narrower base, oblanceolate, sessile or short-petioled, usually more or less runcinate-toothed; scape glabrous; involucres turbinate-campanulate, about 1 cm. high, more or less glandular-hairy with yellowish hairs and slightly tomentulose when young; bracts linear-lanceolate, acuminate; rays yellow, about 1 cm. long; achenes brown, strongly ribbed; pappus white.

This has been confused with *C. runcinata*, but that species has thinner hairy leaves, which are scarcely glaucous. *C. confusa* is really more closely related to *C. glauca*, from which it differs only in the pubescence of the involucre and the usually broader leaves. *C. confusa* grows in valleys from North Dakota and Alberta to Nebraska and Colorado. As the type may be regarded:

WYOMING: Encampment, Carbon Co., 1901, *Tweedy 4081*.

Crepis denticulata sp. nov.

Scapose perennial; leaves basal, obovate or more rarely obovate-oblanceolate, glabrous or nearly so, obtuse, less than 1 cm. long, denticulate or with a few lobes towards the base; scape 1–3 dm. high, glabrous up to the inflorescence; involucre turbinate, scarcely 1 cm. high, hirsute with glandular black hairs, as well as the branches of the inflorescence; ligules about 8 mm. long; achenes brown, strongly ribbed; pappus white.

This species is nearest related to *C. riparia*, but is a much smaller plant in every part and with glabrous leaves. It grows in the mountains.

COLORADO: Lake John, North Park, 1898, *Shear & Bessey 4004* (type).

WYOMING: Fort Bridger, 1873, *Porter*.

UTAH: 1875, *Parry 62*; Jordan Valley, 1869, *Watson 712*.

Crepis angustata sp. nov.

Crepis gracilis Rydb. Mem. N. Y. Bot. Gard. 1: 461, in part. 1900. Not *C. occidentalis gracilis* D. C. Eaton.

Perennial, whole plant more or less canescent-puberulent and scabrous; stem 3–7 dm. high; basal leaves and lower stem-leaves petioled, runcinate; main body narrowly linear-lanceolate, acuminate; lobes linear or linear-lanceolate, usually curved forward; upper stem-leaves entire and sessile; involucre cylindric, about 1 cm. high and 5 mm. broad; bracts 5–7, linear-lanceolate, acute, canescent but not glandular, with a few minute calyculate ones below; flowers 5–10.

This species has been taken for *C. gracilis*, or *C. intermedia gracilis*, under which name it is more commonly known, but the latter has much narrower leaves, the main portion not being wider than the long lobes. *C. intermedia*, to which it is more closely related, has much broader main portion of the leaves, and the lobes are lanceolate and usually directed downward. *C. angustata* grow on hillsides from Montana and Washington to Colorado and Oregon.

COLORADO: North Park, 1896, *Baker* (type).

Agoseris maculata sp. nov.

Leaves oblanceolate, more or less pubescent, especially on the margins and veins; scape 1–2 dm. high, often sparingly hairy and villous under the head; involucre campanulate, about 2 cm. high; outer bracts ovate or ovate-lanceolate, more or less villous especially on the margins, dotted with blackish dots; inner bracts lanceolate; ligules yellow or the outer tinged with reddish; achenes with a short striate beak.

This is somewhat related to *A. villosa*, but differs in the broad acuminate outer bracts. It grows in the mountains of Colorado at an altitude of 3000–3900 m.

COLORADO: Silver Plume, 1895, *Shear 4605* (type); Tennessee Pass, 1902, *Osterhout 2643*.

Agoseris attenuata sp. nov.

Leaves narrowly oblanceolate, 1–1.5 dm. long, glabrous and glaucous, usually denticulate, tapering into a short petiole; scape about 1.5 dm. high, villous near the head; involucre campanulate, about 2 cm. high; outer bracts lanceolate, somewhat villous on the margins, purplish on the back; inner bracts linear-lanceolate long-attenuate, equaling the pappus; achenes light-brown, with thick ribs, contracted above into a short striate beak.

This is related to *A. pumila* and *A. glauca*, but differs from the former in the smaller heads and narrower leaves, from the latter in the more or less villous involucre, and from both in the elongated inner bracts. It grows at an altitude of nearly 3000 m.

COLORADO: Mountain west of North Park, 1900, *Osterhout 2248*.

Agoseris roseata sp. nov.

Leaves about 2 dm. long, long-petioled; blades oblanceolate, acute, denticulate or entire, glabrous and glaucous; scape 5–6 dm.

high, slightly villous above; involucre campanulate, 1.5–2 cm. high; bracts oblong-ovate, acute, nearly glabrous, often with a rose-colored spot in the middle; corolla rose-colored; achenes about 1 cm. long, as well as the short beak strongly striate.

In habit and flowers this resembles most *A. aurantiaca*, but is glabrous and glaucous, and the achene with its short beak places it in the *A. glauca* group.

COLORADO: Bear River, 20 miles below Steamboat Springs, 1899, *Osterhout.*

Agoseris humilis sp. nov.

Leaves spreading or ascending, oblanceolate or linear-oblanceolate, 6–10 cm. long, entire or denticulate, glabrous or slightly hairy on the short petioles; scape 1–1.5 (seldom 2) cm. high, slightly villous below the head; involucre 1.5–2 cm. high; bracts linear-lanceolate, slightly villous-ciliate; corolla rose-purple, or at first orange; achenes 12–15 mm. long, with a long, scarcely striate beak.

This is closely related to *A. gracilens*, but differs in the low habit, small heads and more spreading leaves. It grows at an altitude of about 2700 m.

COLORADO: Ironton Park, 1901, *Underwood & Selby 308* (type); Tennessee Pass, 1902, *Osterhout 2710.*

Agoseris rostrata sp. nov.

Leaves narrowly linear-lanceolate, about 2 dm. long, usually more or less laciniate with linear lobes, glabrous and glaucous; scape 2–6 dm. high, more or less villous, especially under the head; involucre fully 3 cm. high; outer bracts oblong or ovate, obtuse, glabrous, about half as long as the elongated linear or linear-lanceolate inner ones; corolla orange or purple; achenes fully 2 cm. long, with a very long and slender, not striate, beak.

In habit this most resembles *A. elata*, but the bracts and the achenes associate it with *A. grandiflora.*

COLORADO: Lower Boulder Cañon, 1901, *Osterhout 2478* (type); between Sunshine and Ward, 1902, *Tweedy 4895.*

Taraxacum leiospermum sp. nov.

Leaves spreading, oblanceolate, less than 1 dm. long, dark-green, obtuse or acutish, retrorse-dentate, rarely lobed; scape about 1 dm. high, slightly villous when young; outer bracts 7–10 mm. long, lanceolate with spreading tips; inner linear, about

twice as long; neither corniculate; achenes greenish, ribbed, tuberculate above, but otherwise smooth.

Probably related to *T. augustifolium* Greene, but that is described as having much narrower leaves and erect outer bracts. It differs from *T. montanum* in the longer, narrower and spreading bracts and the less lobed leaves.

COLORADO: Tennessee Pass, 1902, *Osterhout 2645* (type); Seven Lakes, 1896, *E. A. Bessey*.

Two new species of Convolvulus from the western United States*

HOMER DOLIVER HOUSE

The two species of *Convolvulus* described below are based upon plants from the collection made by C. S. Crandall in Colorado in 1896. *Convolvulus arvensis* L. is an European species widely introduced into America. There is found, however, an indigenous ally to it in the western states which appears to be distinct.

Convolvulus ambigens sp. nov.

Prostrate or trailing, annual, or perennial only at the base, branching, two to several dm. in length; finely cinereous-pubescent, rather densely so toward the tip, often glabrate below on the stem: leaf-blades ovate-oblong or triangular-oblong, 1.5–4 cm. long, abruptly acute, truncate or nearly so at the base, entire except for the acute, laterally-spreading basal auricles which are often sub-toothed below; petioles shorter than the blades: flowers axillary, solitary, often on erect leafy branches; peduncles 1.5–3 cm. long; pedicels slightly thickened: sepals oblong or suborbicular, about 3 mm. long, rounded at the apex: corolla rotate-funnelform, 1.5–2 cm. long, the subentire limb as broad, white or with pink stripes: stigmas linear.

In loose soil, among bushes and in fields, chiefly in river-valleys, Montana to New Mexico, Oregon and southern California. The type collected near Fort Collins, Colorado, by C. S. Crandall, *no. 4218*, June 22, 1896, in the herbarium of the New York Botanical Garden. Duplicate type of the same collection in the National Herbarium, sheet *no. 486121*. In addition to the type collection the following specimens may be referred here:

Along railroad near Fort Collins, *C. S. Crandall*, August 23, 1898. *C. S. Sheldon 11*, July 8, 1884. Reno, Nevada, *M. E. Jones*, June 11, 1897. Hot Springs, Arizona, *J. W. Toumey 222*, June 17, 1892.

Californian specimens differ from the type chiefly in their more pronounced pubescence, and must be referred here until they are better known.

* Published by permission of the Secretary of the Smithsonian Institution.

Convolvulus interior sp. nov.

Perennial with a horizontal rootstock, prostrate, or the tips rarely showing a tendency to climb, sparingly branched from the base, 2–8 dm. long; rather densely and very softly pubescent throughout, except on the upper leaf-surfaces, with shorter and longer woolly hairs, usually cinereous in appearance: leaf-blades deltoid or hastate-ovate, 2.5–4 cm. long, nearly as broad at the shallowly cordate or subtruncate base, glabrate or becoming glabrous above; the basal auricles inconspicuous, laterally spreading, rounded or obtusely angled; petioles as long as the blades or shorter: peduncles axillary, exceeding the subtending petioles but rarely the blades; bracts broadly ovate, obtuse, about one-third the length of the corolla, closely investing and surpassing the calyx: corolla white, 3.5–4 cm. long, the limb entire, 3–4 cm. broad.

In sandy soil, Nebraska and Colorado to Oklahoma and Arizona. The type collected near Fort Collins, Colorado, by C. S. Crandall, *no. 1625*, June 19, 1896, in the herbarium of the New York Botanical Garden. Duplicate type of the same collection in the National Herbarium, sheet *no. 486123*. The following specimens may also be referred here:

Fort Collins, Colorado, *J. H. Cowen 363*, June 22, 1893. Riley Co., Kansas, *J. B. Norton 354*, 1895. Oklahoma, *F. A. Waugh 361*. Indian Territory, on the False Washita, between Fort Cobb and Fort Arbuckle, *Dr. Edward Palmer 354*, 1868.

This species is perhaps nearest related to the eastern *C. repens* by its prostrate habit and pubescence, but differs greatly from it in the shape of its leaf-blades and its shorter corolla. It has also been referred to *C. americanus* (Sims) Greene, which is nearly or quite glabrous and an extensive twiner.

UNITED STATES NATIONAL MUSEUM.

Phytogeographical explorations in the coastal plain of Georgia in 1903*

ROLAND M. HARPER

My work in the coastal plain of Georgia in 1903 began on the eastern border of Effingham County, where the Seaboard Air Line crosses the Savannah River, about sunrise on June 12, and ended at Macon on September 25. During the summer notes and collections were made in the following counties: Effingham (nos. *1810–1815*, *1837–1840*), Chatham (*1816–1836*, *1841*, *1842*), Bryan (*1843–1850*), Tattnall (*1851–1862*), Montgomery (*1863–1872*, *1981–1990*), Telfair (*1873*), Dodge (*1874–1876*, *1977–1980*), Wilcox, Dooly (*1955–1964*), Sumter, Lee, Terrell, Randolph (*1877–1898*, *1903*), Quitman (*1899–1902*), Clay, Calhoun, Early (*1904–1914*), Miller (*1915–1919*), Decatur (*1920–1935*), Baker (*1936*), Mitchell (*1937*), Thomas (*1938*, *1939*), Colquitt (*1940–1948*), Dougherty (*1949–1954*), Worth, Berrien, Irwin, Houston (*1965–1967*), Bibb (*1968–1971*), Twiggs, (*1972–1976*), Pulaski, Coffee (*1991–1992*, *2010–2014*), Appling (*1993*, *1994*), Liberty (*1995*, *1996*), Wayne (*1997–1998*, *2007–2009*), Glynn, McIntosh (*1999–2006*), Pierce, and Macon (*2015–2018*). Numbers *1810–1866* were collected in June, *1867–1908* in July, *1909–1958* in August and *1959–2018* in September. Forty-two numbers of fungi and bryophytes, numbered separately, were also collected. During the season I traveled by rail through the coastal plain about 1400 miles (nearly half of which distance was through territory I had not previously explored), and took about 275 photographs.

On this trip I made considerable study of the Altamaha Grit, one of the most interesting (from a phytogeographical standpoint at least) and extensive (covering at least 11,000 square miles) geological formations in the state. Very little work has been done in

* Investigation prosecuted with the aid of a grant from the Herrman Fund of the Council of the Scientific Alliance of New York.

the region of this formation by other botanists,* and published references to it are scarce.

As the Altamaha Grit region (the common name of which, when it is distinguished from other portions of the coastal plain, is the "rolling wire-grass" or "rolling piney-woods" country), by reason of its many natural advantages, which have only comparatively recently begun to be appreciated, is increasing very rapidly in wealth and population,† largely at the expense of its once mag-

*The younger Bartram and the elder Michaux, whose routes through Georgia in the eighteenth century are pretty well known, could hardly have seen any of the Altamaha Grit region except perhaps the extreme eastern end of it. There is evidence that at least some of Abbot's drawings of Georgia plants and insects, published in 1797, were made in this region, but no one knows exactly where. About 1830 Nuttall discovered *Arenaria brevifolia* in Tattnall County, presumably on an outcrop of Altamaha Grit, but very little is known of his movements in Georgia. Croom probably skirted the inland edge of this region on his travels through Georgia during the few years immediately preceding his death, but there is no recognizable description of it in his writings. And since the building of railroads probably as many as a dozen well-known botanists have passed through portions of the Altamaha Grit region, usually without stopping, or ventured into it for short distances, without knowing how it differed from the rest of the coastal plain, but very few of these have made public any notes or specimens from there. It is not surprising, therefore, that I should find new species in that region nearly every season. But for the fact that most of the plants indigenous to that part of the state are not endemic, but extend into the flat country near the coast, or into other states, a much larger proportion of them would still be undescribed.

†The nine counties in Georgia which increased in population over 75 per cent. between 1890 and 1900 are all wire-grass counties, wholly or in part. The three showing the largest increase (Colquitt, Irwin and Tattnall, with percentages of 184, 116 and 99 respectively) are entirely underlaid by the Altamaha Grit. During the same period the whole rolling wire-grass country increased in population over 60 per cent., the whole coastal plain of Georgia 28 per cent., the whole state about 20 per cent., and the whole United States (not counting islands acquired during the decade) about 22 per cent. The average density of population in the Altamaha Grit region in 1900 was about 25 to the square mile and that of the whole state 37.5. Fifty years earlier the region under consideration was regarded as almost a desert, and contained less than four inhabitants to the square mile. Even as late as 1880 the density of its population had not reached ten per square mile.

This region is remarkably free from weeds, mud, dust, floods, droughts, gullies, malaria, and extremes of heat and cold; all of which cannot be said of some other parts of the country. The topography is undulating enough to afford good drainage, and at the same time level enough to offer no serious obstacles to easy transportation (which is so essential for the rapid spread of civilization).

The principal source of wealth for this region has been — and will be for many years, if properly managed — *Pinus palustris*, which is probably at present the most important tree in North America from an economic standpoint, rivaling in the variety and usefulness of its products the classical palms and bamboos of the tropics. Increasing attention, however, is being paid to agriculture and manufactures.

nificent pine forests, any information in regard to its flora and other natural resources which can be placed on record now will increase in interest as the region becomes more thickly settled.

The rock which characterizes this part of the state is not known to contain any recognizable fossils, but it is believed to be of Upper Oligocene age.* It is nearly everywhere concealed by overlying Plęistocene deposits (principally Lafayette and Columbia), but in a few places, usually on slopes in dry pine-barrens, it comes to the surface, forming cliffs or sometimes flat outcrops. Such exposures were seen in 1903 in the counties of Tattnall, Coffee, Dodge and Dooly, and, as might be expected from their scarcity and previously unexplored condition, support a flora of

FIGURE 1. Outcrop of Altamaha Grit in open pine-barrens near Pendleton Creek, Tattnall County, June 26. *Liquidambar Styraciflua* in right foreground; the other trees are mostly *Pinus palustris*. This is one of the localities for *Selaginella arenicola* and *Talinum teretifolium*, mentioned below.

unusual interest. Among the species growing on such rocks are some which seem to be endemic to the Altamaha Grit region, and a still larger number which have been considered as characteristic

* For description of this formation see Dall & Harris, Bull. U. S. Geol. Surv. 84: 81, 82. 1892.

of granite outcrops in the Piedmont region. Some of them will be discussed in the latter part of this paper.

The ordinary phase of the Altamaha Grit is readily distinguished, as far away as it can be seen, from all other coastal plain rocks by its surroundings and by the appearance of its weathered surfaces, which are just the color of pine bark or perhaps a little darker. (A fresh surface is pale-yellow or often coarsely mottled with red.) Other coastal plain rocks contain more or less calcium carbonate and are surrounded by dense vegetation, but the Grit crops out in broad daylight and is often visible half a mile away.

The Altamaha Grit as such is not known outside of Georgia, though it underlies about one-fifth of the state or a third of the coastal plain, and extends nearly to the Savannah River on the northeast and the Chattahoochee on the southwest. The Grand Gulf, * a formation believed to be of the same age, extends across the lower part of Alabama, Mississippi, Louisiana and Texas, but its actual continuity with our Grit has not yet been established.

The boundary between the rolling wire-grass region (Altamaha Grit) and the lime-sink region (Lower Oligocene) which adjoins it on the northwest in Georgia (and bears a similar relation to the Grand Gulf region in the states farther west), is one of the most trenchant boundaries in the coastal plain, and, when one becomes accustomed to it, is about as easily recognized as the fall-line. † In 1903 I traced this boundary, by crossing it at every convenient point, through the counties of Dodge, Wilcox, Dooly, Worth, Mitchell and Decatur. ‡ A striking feature of this inland edge of the Altahama Grit country, all the way across the state, especially toward the southwest, is that it is marked by

* Named for Grand Gulf, a settlement on the Mississippi River in Claiborne County, Mississippi, where this formation was first distinguished by B. L. C. Wailes about fifty years ago.

† My first impressions of the change in aspect of the country in passing from one region into the other, traveling southward from Cordele in 1900, were described in the BULLETIN a few years ago (28 : 458. August, 1901). But my interpretation of the geological significance of this change, based on the best information available at that time, subsequent research has shown to be incorrect. (See correction above.) My remarks on *Pinus palustris* in that connection were also largely erroneous.

‡ In the spring of 1904 I traced it farther east, through the counties of Laurens, Emanuel and Screven, nearly to the Savannah River.

an escarpment facing inland, the Grit being everywhere higher than the limestone, doubtless on account of its greater resistance to erosion and solution. In Decatur County, traveling eastward or southward from Bainbridge by rail, one rises about 150 feet in three miles in ascending this escarpment. Elsewhere the difference in elevation is not so great, but always perceptible, as may be seen by examining the profiles of the railroads which pass from one of these regions into the other. From a point on the main Atlantic and Gulf divide a few miles east of Cordele, to the southwestern corner of the state, a distance of at least 100 miles, this escarpment coincides nearly if not exactly with the divide between the Flint River and all the streams flowing into the Gulf east of it.

A similar escarpment is said to mark the inland edge of the corresponding Grand Gulf region in Mississippi and Louisiana.* I am also informed by Dr. Eugene A. Smith, who is familiar with the Grand Gulf region of Alabama and Mississippi and has traveled through the Altamaha Grit region of Georgia, that the topography and flora are essentially the same in both. In 1846, some years before the Grand Gulf formation was named, Artemas Bigelow † described and figured some rock outcrops in Baldwin County, Alabama (now mapped by Dr. Smith as being in the Grand Gulf region), which must be very similar to the Altamaha Grit outcrops in Georgia. That portion of Alabama is described by Dr. Mohr in his "Plant Life of Alabama" ‡ under the name of "lower division of the coast pine belt," but without emphasizing its geological significance.

The southeastern limit of the Altamaha Grit is ill-defined, for the rolling pine-barrens seem to pass by imperceptible gradations into the flat pine-barrens near the coast. Midway between the Savannah River and the Chattahoochee the region under consideration is at least sixty miles wide; but in the vicinity of Climax, in Decatur County, where its limits are pretty sharply defined, its width is not over six miles, and it probably tapers down to nothing a little farther on.

* See Hilgard, Am. Jour. Sci. III. **2**: 397. 1871; III. **22**: 59. 1881: Dall & Harris, Bull. U. S. Geol. Surv. **84**: 161, 168. 1892; Harris & Veatch, Rep. Geol. La. **1899**: 96. 1900; Veatch, Rep. Geol. La. **1900–02**: 156. 1902.

† Am. Jour. Sci. II. **2**: 419–422.

‡ Contr. U. S. Nat. Herb. **6**: 110–118. 1904.

The typical topography of this region (as is finely displayed around Tifton, for example) is gently rolling, less so of course than in Middle Georgia, but decidedly more so than in the adjoining lime-sink region. A straight line drawn in any direction across the rolling wire-grass country would cross, on the average, two or three valleys to the mile, the bottom of each valley containing a sluggish and often intermittent stream, the water of which is never muddy but usually tinged with brown from vegetable matter. The average difference in elevation between the smaller valleys and the adjacent ridges is probably twenty or thirty feet. Creeks and rivers are of course encountered at longer intervals.

Probably at least nine-tenths of this region, in its natural condition, is pine-barrens, and the remainder is mostly swamps, which border every stream, and sand-hills, which occur along most of the creeks and rivers. The lime-sink region, in Southwest Georgia at least, is also about nine-tenths pine-barrens, the remainder being mostly river-swamps, ponds and lime-sinks. Streams are as scarce in the lime-sink region as they are numerous in the Altamaha Grit country. In August, 1903, I went on foot from Bainbridge (on the Flint River) west to the Chattahoochee, a distance of about twenty-eight miles, and did not see a stream of any kind between the two rivers except Spring Creek, which rises in the Eocene country about thirty miles to the northward.

Ponds are less frequent in the region under consideration than in some other parts of the coastal plain, and those that do occur are almost invariably shallow enough to dry up every year, and full of trees (principally *Pinus Elliottii*, *Taxodium imbricarium*, and *Nyssa biflora*); never containing a dense growth of glumaceous plants (such as *Manisuris Chapmani*, *Panicum digitarioides*, *Homalocenchrus hexandrus*, *Eleocharis*, *Dichromena*, *Rhynchospora*) or shrubs (*Crataegus aestivalis*, *Hypericum fasciculatum*, *Cephalanthus*), like many of those along the inland edge of the lime-sink region, or deep and permanent enough to contain species of *Potamogeton*, *Utricularia* and various *Nymphaeaceae*, like the large ponds of Decatur and Lowndes counties. Another interesting feature of this region is that it contains nearly all the sand-hills of the coastal plain, with the exception of those along the fall-line.

The following species are common and conspicuous in the

Altamaha Grit region, but unknown in the adjacent lime-sink region: *Pinus serotina*,*† *Sarracenia flava*,‡ *Cliftonia monophylla*,§ *Nyssa Ogeche*,†§ *Pinckneya pubens*,*†§ *Viburnum nudum*,* and *Baldwinia atropurpurea*.†‖ Many others having a similar distribution might be mentioned, but the above are of particular interest because they extend right up to the edge of the region, and are easily recognized from a moving train, enabling the observant traveler to tell in a few minutes when he enters the Altamaha Grit country from the north or west.

On the other hand, many species which are common in other parts of the coastal plain are conspicuous by their absence in the wiregrass country. The following grow both north and south of the region under consideration, sometimes approaching within a mile of it, but are not known within its borders: *Phegopteris hexagonoptera*, *Uvularia perfoliata*, *Fagus Americana* (and therefore *Epiphegus* too), *Sassafras*, *Kalmia latifolia*, *Asclepias variegata*, and *Conopholis*. The same is true of several species confined to limestone outcrops or permanent ponds, which it would be superflous to mention here. Again, several river-bank trees, such as *Populus deltoides*, *Platanus*, *Acer saccharinum* (*A. dasycarpum*), *Negundo* and *Catalpa*, descend the larger streams nearly or quite to the Altamaha Grit and seem to stop there. And there is a considerable number of species which range from the mountains to the inland edge of the Grit and no farther, but these are too numerous to be discussed here. When the whole truth is known the Altamaha Grit escarpment will probably be found to stop as many species of plants as the fall-line does, though not for the same reasons.

Of the points of interest visited in the summer of 1903 only a few need be mentioned here.

On the morning of my arrival in Georgia, after following down

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* Reappears northwest of the lime-sink region.

† Not known in Alabama. There is probably a gap between the Altamaha Grit and Grand Gulf regions which these species have not succeeded in crossing.

‡ In Georgia the distribution of this species coincides pretty closely with that of the Grit. But in Virginia and the Carolinas it is found farther inland.

§ Reaches its northeastern limit in the extreme southern corner of South Carolina.

‖ Not known in South Carolina (in which State nothing corresponding to the Altamaha Grit has yet been reported).

the Savannah River a few miles from the point where I crossed it, I found myself at Sisters' Ferry, where William Bartram crossed the river on April 25, 1776,* and André Michaux and his son on April 26, 1787.†

Bartram mentioned particularly the occurrence of *Dirca palustris* on the Georgia bank at this point, and Michaux noted, besides the *Dirca*, *Kalmia latifolia*, two azaleas and a few other shrubs.

FIGURE 2. Sisters' Ferry, on the Savannah River (Effingham Co., Georgia, and Hampton Co., South Carolina), looking upstream from the Georgia side. June 12. This is the place where Bartram and Michaux crossed in the eighteenth century.

I had no difficulty in finding the *Dirca* and *Kalmia*, and secured specimens of them (nos. *1815*, *1814*). Both species are very rare so near the coast in this latitude and at so low an altitude (probably not over 50 feet above sea-level). At that time I was not aware of Michaux's visit, and I did not notice the azaleas (which must have been past flowering then) and other plants mentioned by him, one of which seems to have been the recently

* See Bartram's Travels, page 307 (of 1794 edition). The year may have been 1777; for the dates in different parts of this work contradict each other, and I have not yet determined which are correct.

† Journal of André Michaux (edited by C. S. Sargent), page 9. On page 12 is a reference to a subsequent visit to the place on May 13 of the same year.

revived *Magnolia pyramidata* Pursh.* The geographical features of the vicinity of Sisters' Ferry, and in fact the whole east side of Effingham County, are rather peculiar, recalling those of the Chattahoochee region of Decatur and Thomas counties. But nothing definite is known about the geology of this county, and the high water prevented me from getting much light on the subject from the rocks along the river.†

On July 31 I discovered something previously unknown to science and entirely unexpected, viz., sand-hills on the Chattahoochee River. These are located on the left or Georgia side in Early County near Hilton. At all other easily accessible points on the Chattahoochee there is not the slightest suggestion of sand-hills, and I was informed that this particular area is only four or five miles long. Where I crossed it it is about a mile and a half wide. These sand-hills have the same general appearance as many of those in Southeast Georgia, but their flora is not nearly so rich in species, which is just what would be expected from their remoteness from other similar areas.

About the middle of August I went to River Junction, Florida, about two miles south of the Georgia line, examined *Tumion taxifolium* ‡ in its native haunts near there, and then spent nearly two days walking up along the Flint River to Bainbridge, a distance of about thirty miles, trying to find this rare tree in Georgia. In this particular I was unsuccessful, but the trip was by no means unprofitable. In this extreme southwestern corner of the state the phytogeographical features are rather complicated, and therefore interesting, but my time there was too short to make more than a superficial examination.

For the last fifteen miles of its course the Flint River (whose junction with the Chattahoochee marks the corner of the state) washes the northwestern base of an escarpment which is nearly 200 feet high in some places. This is a direct continuation of the

* See Small, Fl. S. E. States 452. July, 1903; Sargent, Trees and Shrubs 1: 101, *pl. 51*. November, 1903.

† This was just after one of the most disastrous floods ever known in South Carolina, and the Savannah River at this point was then nine feet above low water mark and still rising. I noticed however some fossiliferous rocks just above the water's edge.

‡ The odor of the bruised foliage of this tree is frequently mentioned, but I have never seen it described. It reminded me of the odor of the foliage of *Lycopersicum* more than anything else.

Altamaha Grit escarpment mentioned above, but down here in Decatur County, if not for some distance farther east, its base seems to be composed of rocks of a different formation, apparently the Chattahoochee.* The slopes next to the river support a fine forest of angiospermous trees, as is characteristic of the Chattahoochee region. (The transition from the shady woods of the slopes to the open pine-barrens of the summit is very abrupt at Climax and Fowlstown.) At some points along the brow of the escarpment near the river, where the forest has been partly removed, one can get a surprisingly extensive view of the much lower and comparatively level country across the river to the northwestward. At such points the horizon in that direction is so distant that it appears to the unaided eye as a perfect, unbroken, straight line, though doubtless composed of the tops of pine trees.

On top of this escarpment near the Flint River, particularly in the vicinity of Faceville, many square miles are covered with a thick deposit of dry Columbia sand. This supports a flora similar to that of the sand-hills of Southeast Georgia, but differs from all regular sand-hills in its unusual height above the river. It is like the majority of them, however, in being within the Altamaha Grit region, and on the left side of the stream.

Some maps of Georgia show in the northern part of Appling County a pond, which if it is as large as represented must be quite unlike anything else in the Altamaha Grit region. On September 12th, as I was passing through the county, I spent a few hours between trains in trying to find out something about this place. Getting off at Prentiss, the nearest station, I directed my steps northeastward, and after traveling a couple of hours through flat pine-barrens I approached my destination. But I found the pond surrounded by such a dense growth of evergreen trees and shrubs (such as *Magnolia glauca*, *Gordonia*, *Cliftonia*, and *Pieris nitida*) that I could not get a glimpse of it; and the few natives living in

* The portion of this escarpment in Decatur County has been described by Pumpelly (Am. Jour. Sci. III. **46**: 445–448. December, 1893) and Foerste (Am. Jour. Sci. III. **48**: 41–54. July, 1894), but neither of these authors seems to have indicated the occurrence of Altamaha Grit on top of it. I have seen no rocks of this formation farther west than Worth County, but its characteristic topography and flora extend uninterruptedly and unmistakably well into Decatur County. Moreover, the rocks of the Chattahoochee formation are not hard enough to form such an escarpment.

the vicinity do not seem to know much about it, and have not even given it a name, apparently. But from the nature of its surroundings and other considerations, I imagine that this pond must be a good deal like Okefinokee Swamp, on a small scale. Within a mile of the pond the sand is deeper and drier than usual, with a sort of sand-hill flora much like that around the large ponds in the lime-sink regions of Decatur and Lowndes counties.*

Later in September I did some work along the Altamaha River, in the vicinity of the two points where railroads cross it (near Doctortown and Barrington) and around Darien, the seaport at its mouth. Like most of its tributaries, the Altamaha has sand-hills along its left bank, but they are not as extensive (where I saw them, at least) as those farther inland, and their flora seems less varied. Opposite Doctortown the sand-hills are not over a mile wide, near Barrington (station) they are much narrower, and they disappear entirely somewhere above Darien. At both points where I crossed the river its swamp is about a mile wide, containing several elongated "lakes" (bayous they would probably be called farther west), and happens to be all on the left or sand-hill side. The bridge near Barrington is not over twenty miles from the ocean, but the volume of flow of the river is such that the influence of the sea is not felt by the vegetation there, and I was informed that the tide is perceptible only when the river is very low. (The smaller rivers, such as the Ogeechee, Satilla and St. Mary's, at this distance from the coast have several feet of tide and are bordered by brackish marshes.) Even at Darien, which is within ten miles of the open ocean, the river marshes are fresh or nearly so, and contain a good deal of *Taxodium distichum*. Coming up by steamer from Brunswick to Darien the gradual transition from salt to fresh marshes can be plainly seen, the composition of the vegetation changing almost completely while its general aspect remains about the same.

A few miles above the railroad bridge near Barrington is the lowest ferry on the Altamaha, where the Bartrams, father and son, crossed in the 18th century, and discovered that now long-lost tree, *Franklinia Alatamaha* or *Gordonia pubescens*, as it is variously called.† Somewhere near the same point *Leitneria floridana* was

*See Bull. Torrey Club **30**: 291. 1903; **31**: 15. 1904.

† For an account of several attempts to rediscover this tree see Ravenel, Am. Nat. **16**: 235–238. 1882.

found by C. L. Boynton in July, 1901.* My itinerary did not bring me within sight of either of these rare plants, however.

The new species resulting from this trip which have been recognized up to the present writing all happen to belong to groups with which other persons are more familiar than myself, so none are described in this paper. Among the lower cryptogams one moss has already been described by Cardot,† another by Warnstorf,‡ and a fungus by Dr. Murrill. § The first is based on two collections from the lime-sink region, one made in 1902 and one in 1903; and the other two new species are each based on a single collection from the Altamaha Grit region.

Among the pteridophytes and spermatophytes collected in 1903 the following seem worthy of notice:

SELAGINELLA ARENICOLA Underw. Bull. Torrey Club **25**: 541. 1898

Previously known only from Columbia sand in Florida, and Decatur County, Georgia. I have seen it only on Altamaha Grit outcrops in Tattnall County (*nos. 1854, 1860*), where it is quite scarce.

SELAGINELLA ACANTHONOTA Underw. Torreya **2**: 172. 1902

On driest sand hills in Tattnall (*no. 1852*), Montgomery (*no. 1987*) and Liberty counties. A form not quite typical, approaching *S. rupestris*, was collected on an Altamaha Grit outcrop in Dooly County (*no. 1957*). This species was previously known only from North Carolina, unless some Florida specimens are to be referred to it.

SAGITTARIA NATANS Michx.

In shallow grassy pools just west of Savannah, all submersed but the flowers, June 17 (*no. 1831*). This species has an interesting contrivance for protecting its reproductive organs from water. Whenever by any cause the inflorescence is drawn beneath the surface, the pressure of the water causes each flower to

* See Biltmore Bot. Stud. **1**: 143. 1902.
† Rev. Bryol. **31**: 8. 1904.
‡ Bot. Centrabl. Beihefte **16**: 252. 1904.
§ Bull. Torrey Club **31**: 600. 1904.

shut up immediately, enclosing a large bubble of air which keeps the interior dry, and at the same time gives the flower buoyancy to rise to the surface again. This perhaps does not happen often in nature, but the experiment may be performed repeatedly with the same flower.*

ARISTIDA CONDENSATA Chapm.

Collected on Sept. 10 on the sand-hills of Gum Swamp Creek on the western border of Montgomery County (*no. 1982*), and seen later in the same month on the sand-hills of the Altamaha River in Liberty and McIntosh counties, and of the Little Satilla

FIGURE 3. *Selaginella acanthonota* (*no. 1987*) on sand-hills of Little Ocmulgee River, Sept. 10. Photograph taken in dry weather, when the stems were all more or less incurved.

in Wayne County near Hortense. Previously reported only from Florida.

* Since the above was written I notice that the same observation has already been made by Professor Hitchcock (Proc. Iowa Acad. Sci. 9: 215. 1902). But as his note is likely to be overlooked this may as well stand.

FIMBRISTYLIS DIPHYLLA (Retz) Vahl, Enum. **2**: 289. 1806

Common along moist sandy roadsides in and near the swamp of Big Indian Creek on the road from Hayneville to Perry, Houston County, Sept. 3 (*no. 1967*). Also seen the next day in similar situations east of Mossy Creek on the road from Perry to Kathleen, in the same county. This is a tropical species, not previously reported from the United States. Dr. Britton, who identified it, tells me that in the West Indies it is principally a roadside weed also, so that its native habitat is more or less problematical. It is rather remarkable that it should penetrate 200 miles into the interior of Georgia, and establish itself in such localities as the above, several miles from any railroad or settlement, before being detected. What seems to be the same thing was collected on a moist exposed grassy bank at the edge of the Altamaha River marshes just below Darien, two weeks later (*no. 2004*). Its occurrence at this seaport is not so surprising, but even there it appeared to have been long established, and should have been seen before.

LUZULA SALTUENSIS Fernald, Rhodora **5**: 195. 1903

(*L. vernalis*, *L. pilosa* and *Juncoides pilosum* of American authors.)

Seen in rich shady woods on a north slope a few miles northwest of Cuthbert, July 21. Quite rare. This discovery extends its known range about 150 miles southward, and well into the coastal plain. (The opportunity to combine the new specific name with the other generic name now in use will probably not long be neglected, but in the meanwhile we prefer to use the name as above.)

ALETRIS LUTEA Small, Bull. N. Y. Bot. Gard. **1**: 278. 1899

This plant has the aspect of *A. farinosa* with flowers colored almost like those of *A. aurea*. Besides its individual characters (*i. e.*, such as might be exhibited by a single specimen without a label), it differs from the former in range and from the latter in time of flowering, being a month or two earlier. I collected it on June 15 in rather dry pine barrens near Sandfly, Chatham County (*no. 1828*). It was not previously known north of Florida.

CANNA FLACCIDA Salisb.

Like several other species confined to the southeastern United States, this has been greatly neglected by modern bibliographers.

In trying to verify some of the citations for it I found to my surprise that it had been described at least thirty times, and figured eight or ten times. Its bibliographic history is somewhat involved. The principal descriptions, in chronological order, are as follows:

Cannacorus glaucophyllos (etc.), Dill. Hort. Elth. 69. *pl. 59.* 1732. Type locality: "si bene memini, . . . e Carolina, ubi sponte nascitur."

Canna glauca L. Sp. Pl. 1. 1753 (in part). Type locality: "In Carolina?"

? C. glauca L.; Lam. Encyc. 1: 357. 1783. Locality: "dans les lieux humides de la Carolina: on la cultive au Jardin du Roi."

C. flaccida Salisb. Ic. Stirp. Rar. 3. *pl. 2.* 1791. Type locality: "Sponte nascentem in *South Carolina* legit *Johannes Bartram.*"

? C. flava Michx.; Lam. Jour. Hist. Nat. Par. 1: 416. 1792. (*Fide* Ind. Kew.)

C. flaccida Salisb.; Mill. Gard. Dict. (ed. Martyn). 1797. The editor says among other things "It is often confounded with *Canna glauca.*"

C. glauca β flaccida Willd. Sp. Pl. 1: 4. 1798. Locality: "in Carolinae aquosis."

C. flaccida Salisb.; Redouté, Les Liliacées 2: *pl. 107.* 1805. (Specimen figured was cultivated at Malmaison. The author remarks that Fraser and Michaux mention no indigenous *Canna* from Carolina, and as this species is more sensitive to cold than other plants from Carolina, perhaps it came originally from some warmer country. But this is probably explained by the fact that it grows in the extreme southern part of South Carolina, while the other Carolinian plants known to Redouté may have come from the mountains of North Carolina.)

C. flaccida Salisb.; J. E. Smith in Rees Cycl. vol. 6. 1806. "A native of South Carolina, where it was found by Bartram."

C. flaccida Roscoe, Trans. Linn. Soc. 8: 339. 1807. (This is the citation given in the Kew Index.) Type-locality: "Bot. Gard. Liverpool."

C. flaccida Roscoe; Pursh, Fl. Am. Sept. 585. 1814. Locality: "In swamps of South Carolina" (with reference to six earlier descriptions or figures, including Salisbury's and one which I have not seen).

C. flaccida Roscoe; Ell. Bot. S. C. & Ga. 1: 1. 1816. "Grows in wet soils, around ponds; Paris Island, near Beaufort; C[h]atham Co., Georgia."

C. flaccida; Nutt. Gen. 1: 1. 1818. "In Carolina and Georgia."

C. flaccida; Lodd. Bot. Cab. 6: *pl. 562.* 1821. "A native of Carolina and Georgia; we received it about two years since from our valued friend, Dr. Wray of Augusta."

C. flaccida Dill.; Roscoe, Scitamineae (no. 6). 1828. "A native of America, where, Mr. Nuttall informs me, he saw it growing in great quantities on the banks of the Mississippi. Has been cultivated in our gardens many years." (Refers to Dillenius's and Redouté's figures, but not Salisbury's.)

C. Reevesii Lindl. Bot. Reg. 23: *pl.* 2004. 1837. Type-locality: "China."

C. flaccida; Darby, Man. Bot. S. States 247. 1841. "Yellow. May–July. Wet soils. Low country of Car. & Ga. 2–3 feet." (Describes the flowers as red in subsequent editions.)

Eurystylus flaccidus Bouché, Linnaea 18: 485. 1844. (Refers to Salisbury and Willdenow, but mentions no locality.)

Canna flaccida Roscoe; Chapm. Fl. S. States, 466. 1860. (With the longest description in this book and in the three subsequent editions.) Locality: "Miry swamps, Florida and South Carolina, near the coast."

C. flaccida Salisb.; André, Rev. Hort. **1861**: 316–320. *f. 79, 80.* 1861.

Eurystylus flaccidus Bouché; Horan. Prodr. Monog. Scit. 18. 1862. Locality: "In paludosis Carolinae australis."

Canna (§ *Corythium*) *flaccida* Roscoe; Wood, Class-Book 692. 1861. "A fine plant, around ponds, S. Car., Ga. and Fla."

C. flaccida Dill.; Regel, Ind. Sem. Hort. Petrop. **1866**: 85. 1867. (Unites *C. Reevesii* with *C. flaccida*, probably for the first time.)

C. flaccida; Gray, Field, Forest & Garden Bot. 327. 1869. "Wild in swamps from South Carolina S."

C. flaccida Dill.; B. & H. Gen. Pl. 3^2: 655. 1883. "Species boreali Americana."

C. flaccida Dill.; Petersen in Engler & Prantl, Nat. Pflanzenfam. 2^6: 32. 1889. "Aus dem südlichen Nordamerika."

C. flaccida Salisb.; Petersen in Mart. Fl. Bras. 3^3: 74. *pl. 17. f. 2.* 1890. (Cites a recent Florida specimen, and follows Roscoe in crediting the species to the banks of the Mississippi.)

C. flaccida Salisb.; Baker, Gard. Chron. III. **13**: 196. 1893. ("Southern United States; Carolina to Florida, in swamps." Also explains the origin of *C. Reevesii*.)

C. flaccida Salisb.; Bailey, Field, Forest & Garden Bot. 413. 1895; Cycl. Am. Hort. 240. 1900. "Swamps, S. Car. to Fla., near the coast."

C. flaccida Roscoe; Small, Fl. S. E. States 307. 1903. "In swamps near the coast, South Carolina to Florida."

Pursh, Elliott, Chapman, Wood, Small and the Kew Index credit the authorship of the specific name *flaccida* to Roscoe, while Roscoe, Regel, Petersen and Bentham & Hooker credit it to Dillenius, about seven authors credit it to Salisbury, and the remainder do not say where the name originated.

The facts in the case seem to be as follows: Our plant was figured and described in 1732 by Dillenius (but the word *flaccida* does not appear in his polynomial designation), who says the seeds came from Carolina, to the best of his recollection. By Linnaeus it was confounded with *C. glauca*, a very distinct species (if the published figures of it are accurate) of unknown origin. In 1788 Walter reported three species of *Canna* (the same three as in Linnaeus' *Species Plantarum*) from South Carolina, but it is not certain which of his descriptions (if any) applies to the plant in question. In 1791 our plant received its first tenable name from Salisbury, who gave an excellent hand-made colored plate and over a page (a folio page at that) of description. The name *flaccida* was used by at least four other authors before Roscoe, so there is no sufficient reason why it should have ever been credited to him. I have not been able to verify the citation of *C. flava*

Michx., said to have been published in 1792, but there is no *Canna* in Michaux's *Flora*, which appeared eleven years later.

In 1837 Lindley described *C. Reevesii*, from China, saying among other things: "It is very near *C. flaccida*; so very near that it may be doubted whether it is distinct." Baker, in his re-

FIGURE 4. Colony of *Canna flaccida*, in low woods in Chatham County, June 13.

vision of the genus, states that *C. Reevesii* is genuine *C. flaccida*, cultivated and not native in China, and that the same thing has also been seen in cultivation in the Himalayas.

In 1844 *Canna flaccida* and the then supposed distinct *C. Reevesii* were made by Bouché the sole representatives of his new genus *Eurystylus*, which does not seem to have been generally adopted. In 1861 Wood, noticing independently the peculiarities of *C. flaccida*, proposed the sectional name *Corythium* for it. It is not surprising that our plant should differ considerably from other species of *Canna*, for they are mostly confined to the tropics, while *C. flaccida* is definitely known only from South Carolina, Georgia and Florida. (But Roscoe says Nuttall found it on the Mississippi; a statement which deserves investigation.)

Whether there are any other native cannas in this country or not is a little uncertain. Walter describes three species, as already

noted, and Bartram (*Travels*, page 424) mentions a luxuriant growth of *C. indica* along the Amite River in Louisiana in the 18th century,* at which time one would hardly suppose it could have been an escape. Pursh also mentions *C. angustifolia* L. as having been collected in Georgia by Enslen.

Canna flaccida (or horticultural varieties of it) is often seen in cultivation, but it is not certain how and when it first reached the European gardens from which it has since been distributed. Its occurrence in China early in the 19th century or before is a mystery, unless perhaps it is indigenous there after all, like some other plants of the Eastern United States. Another puzzling thing is that most European authors have described the leaves of this species as glaucous, but this does not seem to be true in the wild state.

In my 1903 collection *Canna flaccida* is represented by *no. 1819*, collected on June 13 in Chatham County about nine miles west of Savannah. At this point it grows abundantly (and often six feet tall) in low woods and even spreads over an adjacent railroad embankment. (There can be no question that it is indigenous there, though.) I saw it from a train at the same place two years before, and in August, 1902, I noted it in Charlton and Camden counties, as well as in the adjoining Nassau County, Florida, where it grows in swamps from which the Lafayette formation seems to be absent, as shown by the occurrence of *Taxodium distichum* and certain other significant plants. The photographs reproduced here are perhaps the first ever taken of this species in a wild state.

FIGURE 5. Nearer view of a single specimen of *Canna flaccida* (*no. 1819*).

* *Canna elegans* Raf. (Fl. Lud. 143. 1817) is based on Bartram's description.

EPIDENDRUM CONOPSEUM R.Br.

This, the only epiphytic orchid whose range extends into Georgia, is very hard to find until one becomes acquainted with it, as I know from my own experience and that of some other botanists, and there are few reliable records of its occurrence in the state. Consequently I was agreeably susprised to find it in full bloom near the western corner of Montgomery County on July 3 (*no. 1870*). This locality is about 110 miles from the coast and 200 feet above sea-level. Later in the season I saw it in Dodge County near Eastman, in Dooly County near Cordele, and in Early, Decatur and Thomas counties. The Dooly County station is about 125 miles from the Gulf (the nearest salt water), and 300 feet above sea-level. At all these stations it grew on *Magnolia grandiflora*, and usually high up out of reach. Its preference for this tree was noted long ago by Nuttall, who says in his *Sylva of North America* (1: 97): "It appeared there [near Savannah] to grow on no other tree;" as well as by Elliott and perhaps other writers.

POLYGONELLA CROOMII Chapm. Fl. S. States 387. 1860

Type-locality: "In Carolina or Georgia, probably in the middle districts, *Croom*."

I would refer to this little-known species my specimens collected on the sand-hills of Gum Swamp Creek in Montgomery County, September 10 (*no. 1985*). At that time it was just beginning to flower. Ten weeks earlier I had seen the same thing, without flowers, in similiar situations in Tattnall County. It is a diminutive shrub, not over a foot high and wide, and probably lives only a few years.

Dr. Small in his remarks on this genus a few years ago * refers *P. Croomii* to *P. brachystachya* Meisn., a Florida species, and in so doing states that "the labels show that *Polygonella Croomii* is from 'South Florida,' and not from 'Carolina or Georgia' as Dr. Chapman records in the Flora of the Southern United States." This is not strictly correct, however, for the original label (in Chapman's handwriting) says "South Florida?" showing that Chapman was in doubt about the locality, as he had good reason

* Bull. Torrey Club 23: 407. 1896.

to be, for there is no evidence that Croom was ever in South Florida. It is not unlikely that Croom got his specimens of it on the sand-hills of Brier Creek, on the road from Augusta to Louisville, where he is known to have collected several other interesting plants.

The original specimen is too fragmentary to be of much value for purposes of comparison, but what there is of it seems to be identical with my *no. 1985*. It has longer spikes than *P. brachystachya*, but it is not necessarily specifically distinct. (With this possible exception there is at present no valid species bearing the specific name *Croomii*.)

TALINUM TERETIFOLIUM Pursh

Grows on dry outcrops of Altamaha Grit in the pine-barrens of Tattnall (*no. 1859*, June 26) and Dooly counties, where it seems as much at home as on granite rocks in Middle Georgia. Not previously known from the coastal plain. (It is reported from Florida in Dr. Small's Flora, but I can find no specimens to confirm this.)

PARONYCHIA RIPARIA Chapm.

This species, for a long time known only from the banks of the Flint River in the lime-sink region, now turns out to be not uncommon in Southeast Georgia. In June I saw it more than once in Tattnall County, on July 3 I collected it at the base of the sand-hills of Gum Swamp Creek in Montgomery County, where it was abundant (*no. 1869*), and in September I saw it on both sides of the Ocmulgee River near Lumber City, and on the sand-hills of the Altamaha in Liberty and McIntosh counties.

GIBBESIA RUGELII (Shuttl.) Small

In the Altamaha Grit region near the base of the sand-hills of the Little Ocmulgee River in Montgomery County opposite Lumber City, September 10 (*no. 1990*). Previously known only from Florida and the lime-sink regions of Decatur and Lowndes counties.

CERATOPHYLLUM DEMERSUM L.

On August 27 I found some magnificent but apparently sterile specimens of this (*no. 1952*) growing in a clear cool stream four

or five feet deep issuing from a "blue spring" in the Flint River swamp in Dougherty County a few miles below Albany. The plants were often a yard long or more, and presented a beautiful appearance waving to and fro about the white sandy bottom.

Blue springs are common along some of the streams of the lime-sink region, particularly the Flint River, which flows through this region 100 miles or more. They are the outlets of bold subterranean streams, and their bluish color is due to the dissolved limestone. This particular spring, known in the vicinity as *the* Blue Spring, has been visited by several botanists and at least one geologist, and I am informed by the latter that its flow is about 70,000,000 gallons a day.

PODOSTEMON CERATOPHYLLUS Michx.

Collected on August 26 on submerged limestone rocks in very swift water at the shoals of Muckafoonee * Creek near its confluence with the Flint River a mile or two above Albany (*no. 1950*). Not previously reported from the coastal plain. †

The proposed conversion of these remarkable shoals into a source of water-power threatens the destruction of the *Podostemon*.

TIARELLA CORDIFOLIA L.

Observed in rich damp shady woods in Clay County near Fort Gaines on July 23. Rare. This seems to be its southern limit, as far as known. Dr. Mohr ‡ has reported it from Suggsville, Alabama, which is in the same latitude (31°35′), and Wood § mentions its occurrence near Eufaula, Alabama, which is about twenty miles farther north.

CRATAEGUS GEORGIANA Sarg. Bot. Gaz. **33**: 113. 1902; Silva N. Am. **13**: 63. *pl. 649.* 1902.

The only *Crataegus* I collected in 1903 (*no. 1973*) belongs to this species, according to Mr. Beadle, who identified it. It was

* A modern name, coined a few years ago by citizens of Albany for this creek (which is only a mile or two in length) from the names of its two affluents, Muckalee and Kinchafoonee.

† An early and little-known record of a Georgia station for this species (in the Paleozoic region) occurs in a paper by Julien Deby, entitled "Relation succinte d'une excursion faite aux bords de l Oostanaula en Géorgie, États-Unis" (Bull. Soc. Malacol. Belg. **12**: (3)-(7). 1877).

‡ Contr. U. S. Nat. Herb. **6**: 534. 1901.

§ Class-Book 370. 1861.

previously known only from the type-locality, "low meadows, in rich moist soil near Rome," in the Palaeozoic region; but I found it in the swamp of the Ocmulgee River in Twiggs County about a mile above Westlake, on September 7. There it was associated with two palmettos, *Rhapidophyllum Hystrix* and *Sabal Adansonii*, which are of course wanting at the type-locality. But the two localities have at least one feature in common, calcareous soil. My specimens came from a small tree about two inches in diameter and fifteen feet tall.

PETALOSTEMON FEAVI Chapm.

Collected on the sand-hills of the Altamaha River in Liberty County, September 14 (*no. 1995*); mostly past flowering. Previously known only from peninsular Florida. This plant bears a striking resemblance to *Kuhnistera pinnata*, for which it might easily be mistaken when not in flower.

GERANIUM MACULATUM L.

Seen in rich woods at several points in the northern half of Randoph County, July 16, 17 and 18. Apparently not reported from the coastal plain before.

EUPHORBIA FLORIDANA Chapm. Fl. S. States 401. 1860

E. sphaerosperma Shuttl.; Boiss. in DC. Prodr. **15**^{2}: 102. 1862; Ic. Euph. 17. *pl. 54*. 1866.

Tithymalus sphaerospermus Small, Fl. S. E. States 719. 1903.

Collected in dry sand (sand-hills?) near the Flint River between the state line and Recovery, Decatur County, August 14 (*no. 1931*). Previously known only from Florida and Alabama. (A chance to make a new combination will be noticed in the above synonymy.)

STAPHYLEA TRIFOLIA L.

Fruiting specimens were collected on August 11 on the bank of the Chattahoochee River near Mill Port Landing, Decatur County (just about opposite the southeastern corner of Alabama), in latitude 31° (*no. 1926*). Altitude about 90 feet. The occurrence of this species here was quite a surprise, for it is principally confined to the mountains. The southernmost stations previously known for it were Germain's Island in Columbia County, in the Piedmont region, where I collected it in June, 1902, and the

banks of the Chattahoochee in Quitman County, 60 miles north of the present station, where I saw it in October of the same year. In reaching its southern limit on the Chattahoochee River, *Staphylea trifolia* resembles the considerable number of Alleghanian species which extend down to River Junction, about 30 miles farther south. (See Chapman in Bot. Gaz. **10**: 254. 1885.)

TRIADENUM LONGIFOLIUM Small, Bull. Torrey Club **25**: 140, 141. 1898

Collected on September 5 in the muddy swamp of the Ocmulgee River in Bibb County about two miles below Macon (*no. 1971*). Intimately associated with *T. petiolatum*, which it much resembles; but the fact of their growing together without intergrading is pretty good evidence that these two species are distinct. *T. longifolium* was previously known only from the original specimens collected by Rugel in Alabama and Florida in 1843.

To found a new species on a dried specimen which has been accessible to botanists for over half a century is a practice not usually to be commended, but in this case the subsequent developments seem to have justified it.

VIOLA TRIPARTITA GLABERRIMA (Ging.) Harper

Rather common in rich shady woods in Randolph County (*no. 1881*). Although this is said to intergrade with *V. tripartita* in Alabama * and elsewhere, there is no such intergradation in Southwest Georgia, for the simple reason that *V. tripartita* does not grow there, or anywhere else in the coastal plain, as far as known. However, I am not prepared to raise the variety to specific rank.

Mr. Pollard has assumed † that *V. tripartita glaberrima* does not range south of Athens, Georgia, its place being taken farther south by his *V. tenuipes* (a species which I have not yet collected); which assumption was justifiable at that time, no specimens of var. *glaberrima* from South Georgia being then known.

* Mohr, Contr. U. S. Nat. Herb. **6**: 628. 1901. But Dr. Mohr's statement is inconsistent with other evidence on the same page, for he reports *V. tripartita* only from Lee County (but neither form is mentioned in Earle's later Flora of the Metamorphic Region) and the var. *glaberrima* only from Tuscaloosa County.

† Proc. Biol. Soc. Wash. **15**: 202. 1902.

LYTHRUM CURTISSII Fernald, Bot. Gaz. **33**: 155. 1902

Not rare in the muddy swamp of Spring Creek near Colquitt, Miller County, Aug. 4 (*no. 1918*); also seen on the bank of the same creek near Brinson, Decatur County, eight days later. These two stations are almost in a direct line between the type-locality in Calhoun County and the other station (Aspalaga, Florida) mentioned in the original description.

This species is not mentioned in Koehne's recent monograph of the Lythraceae (Engler's Pflanzenreich, Heft 17. October, 1903).

ERYNGIUM PRAEALTUM Gray, Bost. Jour. Nat. Hist. **6**: 210. 1850. (Pl. Lindh.)

This species has been united by Coulter and Rose with *E. aquaticum* L. (*E. virginianum* Lam.), but it is distinct, certainly varietally if not specifically. On June 18 I collected it for the first time, in the swamp of the Savannah River in the southeastern corner of Effingham County (*no. 1839*). It was not yet in flower, and probably did not begin to flower until July or August. The river was so high at the time* that the plants were about half submerged, and I had to use a boat to get them. My station is within 20 miles of Bluffton, S. C., where Dr. Mellichamp collected the same plant. There is also a specimen in the herbarium of the New York Botanical Garden collected by my friend Mr. M. H. Hopkins in a "marshy spot just below Savannah, Aug. 9, 1897." This station is about the same distance from the two just mentioned as they are from each other.

Dr. Gray's comparison of the leaves of this species to those of a *Rumex* is a very apt one. I mistook the plant for a *Rumex* myself until I saw its budding inflorescence.

Many if not most of the larger leaves bore an appendage the like of which I have never seen described, consisting of what was essentially a smaller leaf 2–6 cm. long, attached near the middle of the upper surface of the true leaf, with its ventral surface facing that of the leaf, its dorsal surface more or less concave, and its midrib adnate for most of its length to that of the leaf. This appendage was too common to be considered a mere monstrosity, but I will not attempt to explain it. I noticed that some insect

* See second footnote on page 149.

or spider had woven a dense web in some of the larger appendages, but this may not mean anything.

ERYNGIUM AROMATICUM Baldw.

In dry sand near Jesup, Wayne County, in flower, September 14 (*no. 1998.*) This extends its known range about 50 miles northward. I found this plant near the Florida line in Charlton and Clinch Counties in August, 1902, but before that it had been known only from Florida. *

The "*Eryngium foetidum* L." mentioned by Michaux and Pursh,† is in all probability *E. aromaticum*, which of course had not then been distinguished, though Michaux must have seen the plant on his travels in northeastern Florida, where it is often collected. Walter also mentioned an *E. foetidum*, the description of which sounds more like what we now call *E. virginianum* Lam. He of course never saw Baldwin's plant, for it does not grow in his territory.

ELLIOTTIA RACEMOSA Muhl.

Since reporting this species from Telfair County,‡ I have found still another station for it, about forty miles farther south, namely, in very dry pine-barrens just north of Douglas, Coffee County,

* In the Torrey Herbarium there is a specimen of it labeled "Near Fort King, Alabama. *Lt. Alden*, 1833", and by reason of this specimen it has been credited to Alabama in Coulter and Rose's *Revision* (1888) and *Monograph* (1900) of North American *Umbelliferae*, and in Small's *Flora of the Southeastern States* (1903). But this species is not mentioned in Dr. Mohr's *Plant Life of Alabama* (1901), and on investigating I find that the "Alabama" on the label must be a clerical error. Torrey and Gray were not misled by it, but it seems strange that they did not correct the label. Fort King is (or was) in Marion County, Florida, near the present city of Ocala, and a battle was fought there April 28, 1840, so it is extremely likely that this is the place where Lieut. Alden was stationed in 1833. Further evidence as to the field of Lieut. Alden's botanical operations is found in Torrey and Gray's *Flora of North America*. In the preface (p. xii) they say: "From Southern and Eastern Florida we have received interesting collections from . . . Lieut. ALDEN of the United States Army." (And this gentleman is not mentioned among their contributors from Alabama.) In the same volume under *Eryngium aromaticum* (page 604), they say: "Dry pine woods, East and Middle Florida, *Baldwin! Dr. Leavenworth! Mr. Alden!*" So we have no evidence that *E. aromaticum* grows within 140 miles of Alabama. Errors of this kind usually die hard, so I have gone into considerable detail in order to suppress this one.

† See C. & R. Rev. N. Am. Umbell. 99. 1888; Contr. U. S. Nat. Herb. 7: 250. 1900.

‡ Torreya 3: 106. 1903.

where I collected it on the morning of September 22, long past flowering (*no. 2011*).* None of the plants were over three or four feet tall. *Elliottia* is a very ordinary-looking bush when not in flower, and might easily be mistaken for something else, particularly for *Diospyros virginiana*, a small form of which sometimes grows in similar situations.

AZALEA CANDIDA Small

Seen only on outcrops of Altamaha Grit, in Tattnall County, June 24 (*no. 1858*) and 26, and in the northeastern corner of Coffee County, September 11. Previously reported only from the type-locality in Lowndes County, but on what formation is not known. At the time I collected it, it was long past flowering;† and the flowers are not yet known, except from a few shrivelled fragments on the type-specimens, which were collected at about the same time of year as mine. This species is probably nearest related to *A. canescens* Mx.

DICERANDRA ODORATISSIMA Harper

Noticed on the sand-hills of the Altamaha River in Liberty County, September 14. Here the corollas were often slightly tinged with pink, making an approach in this respect to the other species of the genus. Captain LeConte's specimen (mentioned in my original description)‡ may have come from near this place.

PENTSTEMON DISSECTUS Ell.

After having been lost to science for seventy years or so, this species was collected on outcrops of Altamaha Grit near the Ohoopee River in Tattnall County on June 24, in fruit (*no. 1856*), and seen in similar situations in Dooly County on August 29. It has a rather interesting history. It was described by Elliott from specimens sent "from Louisville, Georgia," by James Jackson,§ but

* On May 11, 1904, I revisited this spot and found that it had just been burned over and the *Elliottia* completely denuded, but most of the specimens were putting out new leaves again.

† On April 26, 1904, I revisited the spot, and it was just past flowering then.

‡ Bull. Torrey Club **28**: 479. 1901.

§ This James Jackson, afterward a professor in the University of Georgia, seems to have been a son of the General James Jackson who was governor of Georgia from 1798 to 1801, at which time Louisville was the capital of the state.

it is not likely that the specimens were collected close to Louisville, for Mr. M. H. Hopkins, a very observant botanist who has lived in Louisville for years and is familiar with the surrounding country, tells me that he has never seen this plant. But the Altamaha Grit country comes within fifteen miles of Louisville, and if there are any rock outcrops in that part of it, it may have been on one of them that Mr. Jackson found the *Pentstemon*. It was a common practice in Elliott's time (and continues to some extent to the present day, unfortunately) for authors to cite as localities for their specimens merely the nearest town, or the place from which they were sent.

Croom* has published the following note on this species: "Abundant in wet Pine woods, between the Oakmulgee and Oconee Rivers,† Georgia. Flowers in May." His statement that it grows in wet places is rather puzzling (unless perhaps he saw it in rainy weather, when everything was wet), for I find it on dry rocks.‡ And I do not quite understand its being abundant, or growing so far inland.

The fruit of *Pentstemon dissectus* has never been described, but it does not differ noticeably from that of *P. hirsutus* (the common species in Georgia).

UTRICULARIA RESUPINATA B. D. Greene

On the miry margin of a large shallow grassy pine-barren pond in the lime-sink region of Decatur County about two miles southwest of Donalsonville, August 11 (*no. 1925*). Not previously reported from Georgia, or from any other southern state except Florida.

STOKESIA LAEVIS (Hill) Greene

This species has the reputation of being rare, therefore the announcement of a station for it in Georgia may be of interest. On September 9 I collected it in moist pine-barrens in Dodge County near Suomi, in the Altamaha Grit region (*no. 1980*). It was already past flowering.

* Am. Jour. Sci. **25**: 76. 1834.

† Doubtless somewhere between the modern cities of Dublin and Hawkinsville, through or near which points Croom is known to have passed.

‡ The same discrepancy exists between the type-habitat and present known habitat of *Gerardia Flukenetii* Ell. See Mohr, Contr. U. S. Nat. Herb. **6**: 727. 1901.

CARPHEPHORUS TOMENTOSUS (Michx.) T. & G.

This species seems to have such a limited distribution in Georgia that a few stations for it may be worth mentioning. I have seen it only in rather dry nearly flat pine-barrens in the lower part of the Altahama Grit region or between that and the coast, in the counties of Appling, Wayne and Pierce. In September, when it was in flower, I saw it at the following places. In Appling: near Prentiss (*no. 1993*), and between Southern Pines and Hurst (two stations on the B. & B. R. R.); in Wayne: near Hortense and Nahunta; and in Pierce, between Offerman and Bristol.

CHONDROPHORA VIRGATA (Nutt.) Greene, Erythea **3**: 91. 1895

This little known species has an interesting and rather anomalous distribution and somewhat of a history. The only definite stations for it now on record are in the mountains of Alabama, on Carboniferous sandstone. Its occurrence there has been described or discussed by Mohr,* Kearney † and Harbison ‡; and I have seen an immature specimen collected somewhere in the same region by Eggert. In 1903 I met with it quite unexpectedly in Georgia, two or three hundred miles from the Alabama localities and in very different surroundings from those previously described, but associated with a few of the same species which are said to accompany it in Alabama. I found it only on outcrops of Altamaha Grit, in Tattnall (*no. 1857*) and Dooly (*no. 1855*) counties. At the latter station *C. nudata* (which is very abundant in almost all moist pine-barrens) was growing only a few yards away, but the two species were perfectly distinct, though flowering at the same time. There can be little doubt of the identity of my specimens with those from Alabama, but whether any of these are the same as Nuttall's type is another question, as Dr. Mohr pointed out.

CHRYSOMA PAUCIFLOSCULOSA (Michx.) Greene, Erythea **3**: 8. 1895

This, usually considered a sea-beach plant,§ also occurs some distance in the interior. On September 10 I found it at two

* Bull. Torrey Club **24**: 28. 1897; Contr. U. S. Nat. Herb. **6**: 79, 771. 1901.

† Science II. **12**: 833. 30 N 1900.

‡ Biltmore Bot. Stud. **1**: 153. 1902.

§ See Lloyd, Bull. Torrey Club **28**: 445–450. 1901.

places on the western border of Montgomery County, on the sand-hills of Gum Swamp Creek (*no. 1986*) and its continuation, the Little Ocmulgee River. The bushes were about a meter tall, and just beginning to flower. In the Torrey Herbarium there is a specimen collected by Croom still farther inland, on the sand-hills of Brier Creek, Georgia (doubtless on the Augusta-Louisville road, near where Richmond, Burke and Jefferson counties meet), and it is mentioned in some of Croom's letters to Torrey.

ASTER ERYNGIIFOLIUS T. & G. Fl. N. Am. **2**: 502. 1843

Prionopsis Chapmanii T. & G. Fl. N. Am. **2**: 245. 1842. Not *Aster Chapmanii* T. & G. Fl. N. Am. **2**: 161. 1841.

In moist undulating pine-barrens about a mile east of Recovery, Decatur County, August 14 (*no. 1932*); so rare that I could find only two or three good specimens. This locality is near the extreme southwest end of the Altamaha Grit region. The species has been previously reported only from Florida, but on what formation it is of course not stated.

ANTENNARIA SOLITARIA Rydb.

Abundant at one place in rich shady woods near Cuthbert, July 28 (*no. 1903*). This is the only station known for it in the coastal plain, with the exception of Carpenter's original station in Louisiana,* which probably has not been rediscovered. *A. plantaginifolia*, which I have also never seen farther south, grows in drier places in the same woods.

ACANTHOSPERMUM HISPIDUM DC. Prodr. **5**: 522. 1836

Rather abundant in waste places along the river road in the outskirts of Darien, Sept. 16 (*no. 1999*). A native of South America, not previously reported from the United States. It has a very different aspect from its now too common congener *A. australe*, being an erect bushy plant sometimes a meter tall and wide.

* T. & G. Fl. N. A. **2**: 431. 1843. What part of Louisiana is not specified, but a note in Carpenter's handwriting, accompanying the specimen in the Torrey Herbarium, says: "Sides of steep hills, near Jackson, La. Feby. 10th." Jackson (or at least the modern settlement of that name) is in East Feliciana Parish, considerably nearer the coast and farther south than my station, and hundreds of miles from any other known.

A specimen labeled "Ballast ground, Pensacola, Florida," collected by A. H. Curtiss, August 2, 1899 (*no. 6501*, distributed as *A. humile* DC.) is identical with my plant.

HELIANTHUS HETEROPHYLLUS Nutt.

This seems to be quite rare in Georgia. I saw it in September in rather dry pine-barrens near Jesup and Offerman, but not in sufficient quantity to collect.

BALDWINIA ATROPURPUREA Harper

Principally confined to the Altamaha Grit region, but seen also in September, 1903, in the nearly flat pine-barrens of Wayne and Pierce counties, where the Grit may possibly be overlaid by some newer formation. In Wayne County it is quite common, and I secured excellent specimens near Nahunta on the 19th (*no. 2007*). A few days later I found it in two additional counties well within the Grit region, namely, Coffee and Wilcox. Traveling from Douglas to Cordele on the 23d, a distance of about 65 miles through the Altamaha Grit region, I noted this plant seventeen times, between different mile-posts, in four counties. (That such a common, conspicuous and unmistakable plant should have been overlooked until the end of the 19th century is a striking illustration of how little the interior of South Georgia has been explored by botanists.*)

MARSHALLIA RAMOSA Beadle & F. E. Boynton

This recently-described species seems to have considerable variation in habitat. It was discovered in 1900 "in moist, sandy pine-lands at [or near?] Eastman, Georgia." In 1902 I found it in dry pine-barrens in Johnson County,† and in 1903 I found it only on outcrops of Altamaha Grit, in Tattnall (*no. 1855*) and Dodge counties. The latter station is only a couple of miles from Eastman, and therefore somewhere near the type-locality.

MESADENIA DIVERSIFOLIA (T. & G.) Greene

Cacalia diversifolia T. & G. Fl. N. Am. **2**: 435. 1843; Chapm. Fl. S. States 244. 1860. Type-locality (according to Dr. Chapman, the discoverer): "Muddy banks of the Chipola River, [near?] Marianna, West Florida."

* But that part of the railroad from which these seventeen observations were made did not exist in the summer of 1900, when the species was discovered.

† See Bull. Torrey Club **31**: 27. 1904.

Mesadenia differmis Small, Fl. S. E. States 1301. 1903. Type-locality: Walton County, Florida. (Collected by Curtiss in 1885.)

When I was assisting Dr. Small in preparing a key to *Mesadenia* for his Flora we could find no specimen of *M. diversifolia*, and came very near omitting this species entirely as being too little known. The original specimens, collected by Chapman, must have been lost, as the material so labeled in the Torrey Herbarium represents something very different, and inquiry at the Gray Herbarium failed to reveal anything corresponding to the original description.

But within two weeks after the book was given to the public I unexpectedly received a great deal of new light on the subject. On August 4 I found specimens agreeing exactly with Chapman's description (as far as it goes) in the muddy swamps of Spring Creek at two different places: in Early County near Damascus (*no. 1914*) and in Miller County near Colquitt (*no. 1917*.) A couple of months later I saw in the Biltmore Herbarium a good specimen collected on the muddy banks of the Chipola River near Marianna, Florida (the type-locality, apparently), by C. L. Boynton, August 31, 1899.

One important character can now be added to the descriptions of this species; viz., the involucral bracts have winged keels, as in *M. tuberosa*, *M. Floridana*, and *M. sulcata*. *M. diversifolia* differs from these three species, however, in having the stem merely angled, not furrowed (just as Dr. Chapman indicated), as well as in the lobed upper leaves and in habitat.

M. differmis Small, based on a single immature specimen collected in Walton County, Florida, by A. H. Curtiss in 1885, now proves to be merely a young state of *M. diversifolia*, and must be relegated to synonymy.

As now understood, *Mesadenia diversifolia* has a very restricted range, being known only from Early and Miller counties in Georgia and Jackson and Walton counties in Florida, all of which are wholly or partly in the Lower Oligocene or lime-sink region. It is also to be expected in the intervening counties of Decatur in Georgia and Houston in Alabama.

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INDEX TO AMERICAN BOTANICAL LITERATURE

(1905)

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in its broadest sense.

Reviews, and papers which relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omission their kindness will be appreciated.

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Native of the Isle of Pines.

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